

REMARKS

Claims 1-9 and 12-13 were examined in the Office Action mailed on November 30, 2005. The Applicants have deleted the oxygen-containing gas mixtures from the claims, amending claim 1 and cancelling claims 5-8, without prejudice to the subject matter therein. Claims 1-4, 9 and 12-13 remain pending in the present Application.

The pending rejections include:

Claims 1-9 under 35 U.S.C. § 102(b) as anticipated by Japanese patent document JP 410296472 ("Goto").

Claims 12-13 under 35 U.S.C. § 103(a) as unpatentable under over Goto in view of U.S. Patent No. 6,399,915 to Mori, *et al.* ("Mori").

As noted in the Applicant's previous response, the present invention recited in claim 1 is directed to the application of laser diodes for welding of non-ferrous metals, using a process gas with no helium. Previously, because laser diodes have relatively low power as compared to conventional lasers, it has proven difficult to get sufficient laser energy to couple into non-ferrous materials, such as aluminum, due to energy absorption by gaseous materials in the vicinity of the weld (a problem exacerbated by the typically high reflectivity of such materials, which results in an even greater portion of the laser energy being diverted away from the weld). *See, e.g.*, Present Specification at ¶¶[0009]-[0012] (problems with prior attempts at low-power diode laser welding). The Applicant determined that the use of the recited gas mixtures greatly enhanced the deposition of energy from the laser into the target weld location, by both physical

and chemical processes. Thus, the Applicant has developed an industrially-practical use of laser diodes in production non-ferrous material welding.

The Goto reference is cited as teaching laser welding of an aluminum tank having a gaseous shield of carbon dioxide and oxygen. November 30, 2005 Office Action at 2. Goto teaches the use of a gas mixture with a large oxygen content, 38-90%, as necessary to obtain desired weld results. *See, e.g.*, Goto Abstract; ¶ [0008] (“wherein the proportion of oxygen gas in the mixed gas is at least 38 volume% but no more than 90 volume% and is preferably at least 65 volume% but not more than 85 volume%”). Indeed, Goto discloses a comparative example showing the results of welding without oxygen (Goto Fig. 5), in which the welded joint had an undesired geometry, unwanted components (“e.g., aluminum”) were incorporated in the interior of the weld, and “the desired strength was not achieved in the tensile test.” Goto ¶ [0027].

Goto therefore does not disclose or suggest claim 1’s laser welding process, consisting essentially of, *inter alia*, an oxygen-free process gas comprising:

- 100% by volume carbon dioxide, or
- a binary gas mixture of carbon dioxide and argon, or
- a binary gas mixture of carbon dioxide and nitrogen, or
- a ternary gas mixture of carbon dioxide, argon and nitrogen.

Accordingly, claims 1-4, 9 and 12-13 are patentable over Goto under §§ 102(b) and 103(a).¹ Reconsideration and withdrawal of the pending rejections is respectfully requested.

¹ Mori, cited for a laser wavelength of 500 to 1064 nm, does not cure the deficiencies of Goto’s process gas teachings.

CONCLUSION

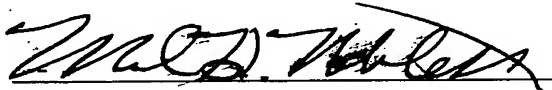
In view of the foregoing, the Applicants respectfully submit that of the requested amendments, claims 1-4, 9 and 12-13 are in condition for allowance. Early and favorable consideration and issuance of a Notice of Allowance for these claims is respectfully requested.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #038724.52699US).

Respectfully submitted,

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